

News and Views

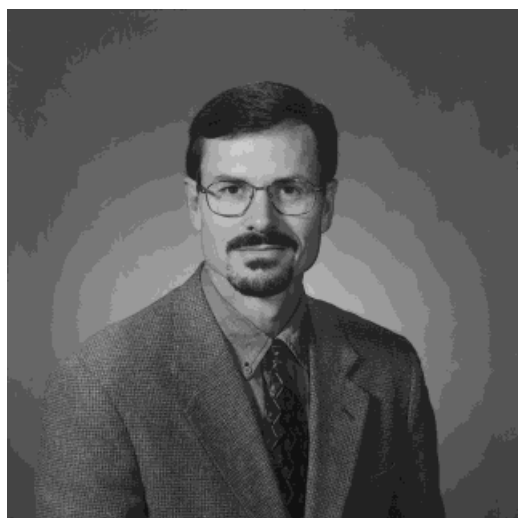
A View on the Science: Physical Anthropology at the Millennium

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EDITOR'S NOTE The year 2000 marks the onset of the 21st century. In this transitional year, prominent physical anthropologists will provide brief reflections on our discipline, including what attracted them to it, and their views on the directions our discipline may pursue as we enter, in January 2001, the third millennium. *Am J Phys Anthropol* 112:1-3, 2000.

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What exactly is physical anthropology? This was a question actually posed to me by a well-known human geneticist with whom I was working as an undergraduate. I had started college as a possible English or music major, with a vague curiosity about anthropology (stimulated, I suppose, by popular accounts such as the Time-Life "Early Man" book and National Geographic's coverage of Louis Leakey and Jane Goodall in the 1960's and early 70's). My first "general" anthropology course was almost completely cultural, as is probably the case at many schools, yet I could still see the potential there for combining cultural and biological studies of humans, which appealed to me. (After all, it seemed obvious that they were two sides of the same coin.) Anthropology appeared to be very broad, almost unlimited in scope: there was room for "generalists," there was also faith (at least back then) that universal laws underlying cultural systems could be discovered, as they were being discovered in biology. My interest was strengthened the next quarter when I took the introductory class in a "Human Biology" series, where a very gifted lecturer devoted a good part of the course to sickle cell anemia, beginning with the development of farming practices in Africa. I was later drawn to the human geneticist because he had written widely on cultural-biological interactions, and was also concerned not only with strictly genetic (molecular) but also morphological (anthropometric) variation, which is where my interests were turning.

So, why was physical anthropology hard to define, even to someone whose work so obviously overlapped the field? At the time I had a difficult time answering the question. Are we just zoologists or paleontologists, but limited in our interests to humans and our closest relatives? After all, many of the most prominent figures in the history of physical anthropology were not trained in departments of anthropology but rather in one of

these (or other) fields (Spencer, 1982). Similarly, much of the research central to our discipline is carried out by people originally trained in other fields, and an even higher percentage by people working outside of traditional anthropology departments.

Thinking back now, I believe that what distinguishes physical anthropology from other disciplines is, paradoxically, the richness of the *cultural* influences on biology that characterizes our species. This includes, of course, cultures of the past (i.e., archaeology) as well as the present. Since language today – and certainly in the recent past at least – is in large part responsible for creating and maintaining cultural distinctions, it deserves special treatment. This, in effect, is the rationale for the traditional “four-field” approach to the teaching of anthropology, which was still the norm when I was a graduate student at the University of Pennsylvania. I have not done a formal survey, but my impression is that this tradition is gradually fading. Part of this trend may be an inevitable consequence of generally increasing specialization and atomization of science, and the need to learn increasingly sophisticated and specialized techniques of analysis (which takes time) in order to stay on the cutting edge. Part may be due to tensions arising from recent changes within cultural anthropology (Cartmill, 1994). In some prominent cases this has led to the actual breakup of departments. But I would argue that without the cultural component of anthropology, we *are* little more than zoologists with a special (egocentric) interest in ourselves. The potential for better understanding the interaction between biology and culture is what attracted me to physical anthropology, and I believe it still has that power of attraction to many undergraduates.

This is not to say that we should become insular, that is, stay within the traditional bounds of anthropology just to maintain some historical status quo. In my case I found tremendous inspiration as a graduate student from a completely different source: engineering biomechanics. I had been struggling to find new ways of interpreting skeletal morphology – to escape the mainly descriptive and sometimes plainly typological

analyses of the past. I stumbled onto a bio-engineer at Penn, Toby Hayes, who had broad enough interests to encourage me (or at least suffer through my attempts!) to apply biomechanics theory to human long bone cross sections. As it turned out, I discovered this route at a very opportune time; microcomputers and electronic digitizers were just becoming widely available in the late 1970's, so that it soon became possible to carry out such studies in large samples, something unfeasible just a few years before. In my thesis I was able to merge the very effective models developed by engineers with a comparative and demographic approach learned from anthropology. This is a good example of cross-fertilization between fields. The engineering component, though, would have been wasted without the full anthropological (including cultural) context: biomechanics would have been a very dull science to me if I had not been able to apply it to issues involving the reconstruction of past human biology and behavior (e.g., Ruff, 1987). In this regard, it is also worth noting that transfers of knowledge of this kind — between more and less technically-oriented fields — is not all one-way. For example, there is a lot that engineers (and others) can learn from anthropologists about biological variability and other non-mechanical influences on morphology (Eveleth and Tanner, 1976; Ruff, 1994).

My foray into this new field was not without its bumps. I was once asked by a young, soon-to-be prominent physical anthropologist to whom I had just described my thesis work, “That’s interesting, but what does it have to do with anthropology?” The comment was prompted, I believe, by the apparent primary motivation for my thesis of explaining osteoporotic fracture patterns among modern populations (a “clinical” issue) (Ruff and Hayes, 1983) and by the fact that I was actually carrying out the analyses in an orthopedic biomechanics laboratory. This is really the flip side of the question posed earlier: not what is the central defining characteristic of physical anthropology, but rather how wide can the field be stretched and still maintain its cohesiveness as a scientific discipline? The two questions are actually related, since a strong

center will promote cohesion even among increasingly disparate subdisciplines. The key again, I believe, is to not lose sight of the fact that we are anthropologists (however painful that may seem at times!), that our ultimate aim is to elucidate the coevolution of biology and culture, and that any techniques bearing on that issue are legitimate tools to use. We must also not forget that the tools are only tools, though, and not ends in themselves. The excitement of physical anthropology, to me, will always be in unraveling just a bit more about our evolutionary history: where we are today and how we got there. Our greatest strength lies in recognizing this aim and its roots in anthropology.

This brings to bear another question concerning physical anthropology's role in the research community: To what extent should we be involved in, or even concerned with clinically related projects? Does such involvement somehow taint our research or divert it away from issues of central concern to physical anthropology, by driving it towards more "practical" or "applied" goals? There are certainly obvious advantages in terms of funding and magnitude of scope of studies that can be carried out when linked to clinically relevant issues (Rogers et al., 1999). But there are other reasons, too, to consider clinical studies as a useful and even integral part of what physical anthropologists do. The first is the broader perspective that we can give to many such studies, as alluded to above. Our input can be critical, and increase both the validity and eventual applicability of results. Secondly, we can learn much about basic processes of biological adaptation from clinical situations. For example, in my work, loss of bone under conditions of reduced mechanical loading (with age, paralysis, spaceflight, etc.) to some extent parallels declines in bone robustness that are observed in humans during the Pleistocene (Ruff et al., 1993). The relative magnitude of such changes under observable conditions in

modern humans can provide important background for interpreting past variation; conversely, the level of skeletal robustness in earlier humans provides an important baseline against which to compare modern people, with our increased risk for osteoporotic fractures and other medical problems related to a sedentary lifestyle (Nguyen et al., 2000).

The underlying message here is that physical anthropologists do have an identity and an important role to play within science, regardless of what department we are located in or how often we cross traditional academic lines. Some increase in factionalization and subdiscipline isolation may be inevitable, but this makes it even more important to find common grounds for communication and interaction. Always keeping the "big picture" in mind, even while we labor at increasingly specialized and diverse tasks, rather than diluting or distracting us, will save us as a discipline.

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